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UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Summary Review of Monthly Reports\*  
for  
SOIL CONSERVATION SERVICE RESEARCH\*\*

MAY 1944



EROSION CONTROL PRACTICES DIVISION

Conservation Experiment Stations Section

Dwight D. Smith of McCredie, Missouri reports: "Annual Rotations and Continuous Grass-Legume Grazing Areas.-Wheat-lespedeza has produced an annual average of 241 pounds of beef per acre, during the past 4 years, with annual requirements of power, labor, and machinery for production limited to disking the soil and drilling the wheat. The soil and water losses have been 70 to 121 per cent, respectively, of that from a corn-wheat-sweet clover timothy rotation. Areas of timothy-lespedeza and timothy-lespedeza-sweet clover have produced 93 and 96 per cent, respectively, as much beef as wheat-lespedeza, with insignificant soil loss, low runoff, and practically without the use of power, labor or machinery, since the original establishment in 1939. Runoff from the area with the sweet clover has been only 72 per cent of that from the wheat-lespedeza and less than that from any rotation studied.

"Wheat and oats in annual rotations with lespedeza have had about equal runoff and soil loss. Erosion from wheat-lespedeza is increased somewhat in the fall by disking and seeding of the wheat, although this is offset by the increased losses from disking and drilling of the oats in the spring. The advantage in favor of the wheat has been a better seasonal distribution of farm labor.

"Production from the wheat-lespedeza area has been consistently high except for 1943. Wet weather during the wheat grazing season with a light lespedeza seed crop the preceding fall reduced the return from the lespedeza appreciably below normal. Complete utilization of the wheat was not possible.

"On the timothy-lespedeza area maximum production was not reached until the third year after seeding due to a gradual development of the timothy stand. The response to lime and fertilizer treatments on all grass areas has been observed to be greatest the second and third years after application.

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"The timothy-lespedeza-sweet clover area has produced nearly as much beef as wheat-lespedeza. Highest returns from this area have been during the second year sweet clover grazing seasons. The establishment of a mixed first and second year sweet clover stand has not been successful. More careful grazing management has been required on this than on the timothy-lespedeza area.

"A biannual application of fertilizer equivalent to that used on the small grain lespedeza areas was started in the spring of 1943. Early results indicate a substantial increase in production from the practice. An experimental machine for placing the fertilizer at depths of 4 to 8 inches without plowing of the sod has been developed and its use is being tested.

"An annual rotation of winter barley-soybeans has produced an annual return of 81 pounds beef and 1.31 tons soybean hay per acre, while allowing 14 per cent more runoff and 31 per cent more soil loss than that from a rotation of corn-wheat-sweet clover timothy. Practically all of the beef production from the barley has been from spring grazing.

"The bluegrass areas were grazed for the first time in 1943. Production for them averaged 122 pounds beef per acre in comparison to an average of 226 pounds beef per acre for the fertilized timothy-legume pasture areas.

"Table 1.-Average annual erosion losses (1941-43) and crop or beef production (1940-43) from the grazing areas and the ungrazed small grain-lespedeza plots. Putnam silt loam, 3 per cent slope. Erosion plots 90 feet long with up-and-down hill operation. Average rainfall (1941-43) 44.6 inches; normal rainfall 39.2 inches. All plots limed, and with 0-20-10 fertilizer on small grain.

Crop or rotation	Runoff		Soil loss Tons per acre	Production per acre			
	Inches	Per cent		Tons hay	Pounds beef	Animal days	Corn equiv- alent
Timothy-lespedeza, both grazed	12.7	29	0.58	-	224	146	35
Timothy-lespedeza- sweet clover, all grazed	10.0	22	0.54	-	231	168	36
Oats for hay - lespedeza grazed	13.5	30	3.14	1.34	116	96	39
Wheat and Lespedeza, both grazed	13.9	31	3.19	-	241	160	37
Oats for hay - Lespedeza for hay	12.2	27	2.45	1.20 .82	-	-	35
Wheat for grain, Lespedeza for hay	12.6	28	2.14	14.3 bu. .93	-	-	35
Soybeans for hay, W. barley grazed	13.1	29	5.92	1.31	81	59	35
Corn-wheat-sweet clover timothy	11.5	26	4.53	-	-	-	29



"During 1943 erosion data was secured from 9 corn plots following different treatments. Erosion from three plots in corn following a grass-legume meadow was measured for the first time. The addition of the grass to the preceding meadow reduced erosion from the corn to about one-half of that when corn followed sweet clover alone. Data from the 1943 corn plots are shown in Table 2. Corn yields in 1943, as well as the preceding two years, have been relatively high; thus the loss in soil per bushel of corn produced as shown in the table may be lower than the long-time average.

Table 2.-Erosion and yield data for corn during 1943 as affected by different preceding crops and treatments.

Corn preceded by -	Soil loss T./Acre	Yield Bu./Acre	Soil loss T./Bushel
1. Grass-legume meadow -- good (1).....	2.4	37.0	.07
2. Grass-legume meadow -- poor (2).....	3.3	49.4	.07
3. Sweet clover timothy meadow.....	3.9	33.3	.12
4. Sweet clover under as green manure...	7.0	42.6	.16
5. Lespedeza.....	12.3	36.1	.34
6. Corn (of line 4).....	13.6	36.0	.38
7. Oats (No meadow or treatment).....	21.4	31.0	.69

(1) First year meadow which yielded 1.0 tons per acre.

(2) Second year meadow which yielded 0.6 tons per acre."

J. T. Bregger of Clemson, South Carolina reports: "A second set of yield counts were made of various winter cover crop species to show their fertility and residue values at a later stage of maturity. These data are combined with the earlier data (in the following table) to show the relative differences in ground coverage and moisture content of the cover crops:

Species	Green weight Tons/acre		Dry weight Tons/acre	
	April 14	May 18	April 14	May 18
So. spotted bur clover (early strain)	16.0	13.25	2.4	3.6
Crimson clover.....	8.0	13.75	1.2	5.8
Vicia grandiflora.....	6.25	9.25	0.7	3.9
Button clover.....	4.0	8.75	1.25	3.4

"It will be noted from the above data that the early strain of Southern spotted bur clover stands out as an early maturing winter cover crop. While producing a heavy ground cover in early spring, the final residue of dry matter is not as great as in the case of other legume species. On the other hand, its chief value as a peach orchard cover crop lies in its early maturity date. This factor keeps it from competing seriously with the fruit trees for soil moisture at a period of the year when the latter's requirements for both moisture and nitrates are unusually great."

Joseph Belanger of Pendleton, Oregon reports: "Farm trials this year are attracting more attention from the farmers than was the case last year, even though interest was keen at that time. One reason for this is the good showing to date of the wheat that was seeded on last year's summer fallow. A second reason is the larger outfit being used this spring. Power units on Eastern Oregon wheat ranches are large. The acreage to be covered on the average wheat ranch is so great that width of individual operations is a large factor in economy of farming. By covering 14 feet as I have been doing this spring for initial tillage operations which are ordinarily done with about a 8 ft. width, the amount of land covered in one day is materially increased. Without an actual measure of the drift involved it is not possible to say accurately what the comparison is between 14 ft. with the sub-tillage tools I have been using and the customary 8 ft. of moldboard plows. Depending upon the nature of the soil and the slope most farmers figure 25-30 acres as the normal amount to plow during the day shift. With the 14 ft. width of sub-surface tillage machinery I have been able to work 60 acres in eleven hours."

H. O. Hill of Temple, Texas reports: "The major storm of the month occurred on May 1 and 2 in which 3.55" of rain fell in approximately five hours with rainfall intensities 6" per hour for 5 minute periods, 3.60" for 15 minute periods and 3.10" for 30 minute periods. This storm caused severe erosion damage in the area. Many terraces were overtopped and gullying was general. However, in no case have I observed or have I seen anyone who verified the fact that any terrace was overtopped that was up to the minimum A.A.A. recommended effective height of 15". This means that terraces of standard design properly maintained would have adequately taken care of this storm. Terracing in general has received derogatory criticism from farmers and SCS officials who have not verified the fact that the terraces were not maintained properly in all reported cases of overtopping."

F. L. Duley of Lincoln, Nebraska reports: "For killing weeds or volunteer grain on subtilled land, tests are indicating that by using two treaders in tandem with the left or right ends chained together so that they pull askew, very effective weed eradication can be accomplished. This operation is being called "skew treading." With further development of equipment, many operations are being done by pulling more than one piece of equipment at one time. A treader with a corn planter pulled behind has been found an efficient method of smoothing subtilled ground, pulverizing clods, and planting corn at one operation."

Dwight D. Smith of Columbia, Missouri reports: "Nine corn plots and one wheat-lespedeza plot of the Series II plots at McCredie have been sampled for aggregate analysis and organic matter determinations which will be made in the next few weeks. These plots are now beginning the second rotation cycle. Appearance as well as soil and water losses suggest a wide difference in soil granulation as a result of the method of handling.

"Earthworm activity was observed to be very extensive on soil treated plots and practically absent on the untreated corn-oats rotation plots."

George W. Hood of Batesville, Arkansas reports: "The Spring Visiting Day of the Experiment Station was held on May 26. This was most successful, and the attendance was over 500 people from this and adjoining counties. The special features studied were small grains, especially the newer varieties of oats, and conservation plots. The interest of the people attending seemed to be above the average and discussion of the work was very interesting. The comment of several people who had visited other sections, was that the oats varieties here were the best that had been seen anywhere."

Joel E. Fletcher of Tucson, Arizona reports: "Further investigations of the extent of the poor physical structure ("puddling") in the Salt River Valley seems to indicate that as a general rule this condition is the result of a certain type of farming practice. The layer of compaction was either absent or slight in virgin soil adjacent to cultivated fields in which the layer was very marked. For example, the volume weights of soil in the virgin area compared to an alfalfa field about 50 feet away were as follows:

Depth	Volume weights	
	Virgin area	Alfalfa field
0 - 2	1.580	1.557
2 - 4	1.665	1.598
4 - 6	1.585	1.776
6 - 8	1.575	1.794
8 - 10	1.469	1.593
10 - 12	1.575	1.662

"The above alfalfa field was checked for penetration 24 hours after an irrigation and it was found that the water had only penetrated to a depth of about 14 inches.

"Indications are that where cover crops have been incorporated the problem is non-existent."

Oren R. Neal of New Brunswick, New Jersey reports:

"Table 1.-Yields of radishes from compost study, Marlboro 1944

	Block A	Block B	Block C
Total weight of radishes (pounds)...	1.75	3.33	2.85
Total weight of tops (pounds).....	1.58	3.25	2.55
Number of immature radishes.....	39	18	23

Treatments: Block A - No treatment  
 Block B - 1000 lbs/acre of 4-10-10  
 Block C - 20 tons/acre cornstalk compost +  
 300 lbs/acre superphosphate"



J. W. Slosser of Presque Isle, Maine reports: "The greater portion of the month was spent preparing land and planting. One series of row placement studies on terraces was put in at the request of Mr. Raths, Regional Engineer. Time studies on this operation involving point rows indicated that an increase of nearly 20 per cent in time was required for the planting operation alone. Land preparation time was increased 32 per cent. This increase of time consumed was primarily due to the excess turning time and dead runs. Other factors affecting operations included necessity of making turns on prepared land and long drives to seed and fertilizer sources."

J. B. Pope of Tyler, Texas reports: "The two rainstorms on April 29 and 30 and May 1 and 2 with a total of 8.83 inches produced some all-time high losses on control plot areas. A summary of the soil losses on a group of 1/50 acre plots in different crops and cropping systems for these two rains is compared to a four-year annual average of the same plots and treatments in the following table.

Crops and cropping systems	Soil loss per acre for rains of May 29-30, June 1-2, 1944	Average annual soil loss per acre for past 4 years 1940-43
	Tons	Tons
Corn - no cover crop.....	6.98	5.64
Cotton - no cover crop.....	12.69	8.56
Rotation 1/ - cotton with vetch cover crop.....	7.09	8.88
Rotation 1/ - corn with oat cover crop..	7.07	7.75
Rotation 1/ - oats following cotton.....	.19	4.18
Oats - with cowpea summer cover crop....	.10	2.80
Cotton - vetch cover crop.....	13.90	10.43

1/ The rotation in the system is corn, cotton, and oats with vetch cover crop following corn in the fall preceding cotton in the spring. Oats following cotton in the fall. The average annual rainfall for 1940-43 was 47.10 inches. The total rainfall for May 29-30 and June 1-2, 1944 was 8.83 inches."

J. L. Gardner of State College, New Mexico reports: "There has been less than 2.5 inches of precipitation at Mexican Springs since January 1, and the wind has been worse than it has been for several years. It was reported by Mr. George Thompson of the Indian Service that during one of the heavier wind storms visibility just off the Mexican Springs Area was less than a hundred yards due to blowing soil, whereas over in the Area it was well over a mile."

H. L. Borst of Zanesville, Ohio reports: "Several days were spent draining tanks and recording runoff. The stripped versus not stripped plots produced some interesting results. The unstripped corn plots lost almost exactly 27 tons per acre in the hard 3 rains whereas the



stripped plots in 3 strips with corn on the lowest strip, lost 9 tons. Apparently, the ordinarily expected effect of length of slope did not obtain, perhaps because of the runoff from the strips above the corn. The plots where corn occupies the upper or middle strip lost less than 2 tons per acre."

C. J. Whitfield of Amarillo, Texas reports: "A very interesting and important point regarding the affect of precipitation and humidity on gains made by grazing steers was brought out by the weighing of Groups II and IV on May 15. Because little effective precipitation was received during the later winter and early spring period, grasses in the various pastures were showing signs of drought by the middle of May. Beginning with a trace of precipitation on May 21, a total of 2.64 inches was received during the last half of the month. All of this rain fell with a very low intensity and the relative humidity was generally high.

"Group II, which made somewhat the best gain the first 14 days of May, more than doubled this gain the last half of the period, while the gains of Group IV during the last half of the period more than tripled that of the first half for this group. Assuming that Group II, which grazed in Pasture F the first half of May, would represent the gain made by Group I normally assigned to Pasture F, this pasture produced nearly 100 per cent better gains the last half as compared to the first half of May.

"Granting that a portion of the gain made during the last half of May could justly be assigned to fill, there still remains a striking example of how gains go down during drought and increase rapidly when moisture becomes favorable for plant growth.

"The high gains which steers will make on reseeded areas and the returns per acre of these areas has been clearly demonstrated during the past two months. Steers grazing pastures reseeded to a mixture of summer and winter grasses have made an average daily gain of 2.19 pounds as compared to steers on native pasture which have made an average daily gain of 1.94. A 44-acre reseeded pasture of western wheatgrass and Canada wild-rye has made a gross return of \$7.48 an acre from April 1 to March 31 from grazing. Another area reseeded to a mixture of winter and summer grasses yielded a gross return from grazing of \$5.58 an acre during the month of May."

Hugh C. McKay of Aberdeen, Idaho reports: "The new John Deere 30-inch sweep machine was tried out for the first time this year. Considerable trouble was encountered in getting the machine to work at a uniform depth. New notches had to be cut for the levers to get it to operate shallow enough. Iron rods were welded on the sweeps to stir the soil more. Even with the iron rods on the sweeps, the soil was not stirred enough to kill the volunteer wheat and weeds. In this respect, the sweep machine is not as good as the modified rod weeder with shovel attachments. It is felt that it will be necessary to rod weed all the fields done with the sweep machine as soon as it is dry enough so that the volunteer wheat can be killed."

T. L. Copley of Raleigh, North Carolina reports: "The following table shows the average soil and water losses from tobacco plots having different land covers during the fall and winter months in comparison to the losses from the same plots from a single rain during the summer of 1943.

"The comparative effects of different crops as surface cover and incorporated material on runoff and erosion from tobacco plots - Durham Sandy Loam, 1.5 per cent slope

Winter cover crop or crop in rotation	Period: 10-1-43 to 4-8-44		Rain of June 8 and 9, 1943	
	Rainfall 22.50 inches		Rainfall 5.01 inches	
	Runoff Pct.	Soil loss T/A	Runoff Pct.	Soil loss T/A
Native weeds <u>1</u> /.....	7	0.2	47	4.0
Rye grass.....	7	.3	43	5.3
Rye.....	13	.4	49	6.0
Red top grass <u>1</u> /.....	25	.5	48	6.9
Check (No winter cover).....	10	.2	36	9.9

1/ Planted to tobacco in the summer of 1943.

"The weeds and check plots each had a very good cover of crab grass and old tobacco stalks during the entire fall and winter period. The other three plots had established a good cover by the first of November."

G. M. Browning of Ames, Iowa reports: "It is of interest to note that there has not been a runoff record at the Clarinda Experimental Farm since September 1943. During this period there was a total of 20.21 inches of rainfall. In April there was 6.69 inches of rainfall none of which produced runoff because of low intensity and good distribution of the rainfall.

"There had been sufficient rain and snow during the winter months to bring the moisture content of the soil to the field capacity by the last of March. Since the soil at the surface would not hold any additional water, the rainfall during the month of April would necessarily pass through the soil carrying with it any soluble nutrients that may have been in solution. The leaching of nitrates to levels below which plant roots penetrate early in the spring apparently is one of the reasons for the large amount of nitrogen deficiency that is evident in the oats crop throughout the State. It also is partly related to the cool, moist weather which is not conducive to biological activity to provide available nitrates for the growing crop."

R. E. Dickson of Spur, Texas reports: "Soil moisture determinations, made on May 20 of each year since 1930, showed the total soil moisture content in the upper three feet of soil for this year to be the third lowest in the 15-year period. Moisture stored in the soil at this time gives a pretty good indication of what crop yields will be for the year. Correlations between the amount of water stored in the second and third feet and the yield of cotton in Dickens County over the 15-year period have given a correlation coefficient of around .80 of the 1.60 inches



of available moisture in the upper three feet, .62 inch is in the second and third feet which indicates that cotton yields this year will fall under 100 pounds of lint cotton per acre. The total soil moisture in the upper six feet of soil was 1.95 inches of available water. Pretty good evidence as to the amount of soil moisture that was lost through evaporation was shown when the total soil moisture in the upper three feet of soil on May 20 was compared with the total soil moisture in the upper three feet on April 20. There was only .05 inch difference in these totals and there was no significant change in the soil moisture content in any of the six feet, yet 1.13 inches of rain fell during this period."

Harley A. Daniel of Guthrie, Oklahoma reports: "Thirty yearling steers are being used in a summer grazing test at Guthrie on cleared virgin scrubby oak land, regrassed abandoned severe sheet and gulley eroded land and formerly cultivated revegetated land. During the period of April 24 to May 15, inclusive, the steers made a daily gain of 3.26 pounds on the virgin land, 2.15 pounds on the severely eroded land and 3.05 pounds on the formerly cultivated land. Each area is being grazed in accordance with the best known method of conservative grazing."

John Lamb, Jr. of Ithaca, New York reports: "Cover crop observations at Geneva.-The plots seeded to orchard cover crops indicate several very promising covers for this vicinity. Covers recommended for apple orchards that have come through the second winter in excellent condition are: creeping red fescue, sheet fescue, tall fescue, and brage orchard grass. Washington brome grass is in pure stand but is not producing quite as dense a cover as the first four. Weeping lovegrass is losing out although some growth can still be noted. Birdsfoot trefoil has persisted but is not in pure stand, being infested with grasses which it seems to stimulate. Crown vetch is slowly improving in stand but it is far from being a complete cover."

"Of the four covers recommended for peach orchards only field brome appears promising. This grass provides a better winter cover than fall sown rye. Black medick and spotted bur clover have not survived. Bulbous bluegrass, which appeared last spring, has failed to show the third season."

C. S. Slater of College Park, Maryland reports: "Some chemical analyses have been made of sawdust and sawdust-manures in connection with the Hillculture studies at Beltsville. Sawdust appears to have a high absorptive capacity for the soluble nitrogen of animal manures, and to be able to hold the nitrogen for some time against field leaching. Its capacity to hold the nitrogen solutes that will be available commercially after the war was not tested, but an hypothesis is warranted that the effects of heavy applications of soluble nitrogen can be 'spread' to advantage by the use of some such absorptive material."



# Hillculture Section

C. S. Britt of Beltsville, Maryland reports: "Linear growth measurements of native highbush blueberries planted in a pitch and Virginia pine stand have given some interesting indications. Varying degrees of thinning of the pines and understory seemed to be relatively without effect on growth. However, fertilizer applications caused a marked growth response, particularly when 1200 pounds per acre was used as shown in the following table:

Fertilizer application		Linear growth - 1943 (Inches)
May 1942	May 1943	
Chicken manure	None	240
1200 lbs. 7-6-4	None	350
200 lbs. 7-6-4	200 lbs. 7-6-4	150
Check	Check	100

"Height and basal diameter measurements have been made on Asiatic hybrid chestnuts planted in 1938 in a thinned Virginia pine stand. The chestnuts under the heavy thinning had an average height of 7.2 feet and an average basal diameter of 1.7 inches. The chestnuts under moderate thinning had an average height of 8.1 feet and an average basal diameter of 1.6 inches. The chestnuts in the heavily thinned area bore a good crop of nuts in 1943 while those in the moderately thinned area bore only lightly or not at all."

V. T. Stoutemyer and F. L. O'Rourke of Glenn Dale, Maryland report: "Late in the summer of 1943 some experiments were started to determine if the application of sprays containing growth substances to the foliage of trees of black locust would cause better rooting of the hardwood cuttings made in the following spring. On September 2, one series of trees were sprayed with a solution containing 800 mg/l of indole acetic acid plus 0.1 per cent Tergitol 7 as a spreader. Another group of trees received a similar spray containing potassium naphthyl acetate, and another lot was left for controls. Hardwood cuttings were taken from the three groups of trees and were callused and rooted without any further treatment. Only 8 per cent of the hardwood cutting from the control lot rooted and the roots were few and sparse. Twenty-two per cent of the cuttings from trees receiving the spray with indoleacetic acid rooted and the roots produced were invariably numerous and heavy. Similarly, 23 per cent of all lots of cuttings from the trees sprayed with the other chemical rooted. These results apparently indicate that the spraying increased the rooting capabilities of the cuttings, although it had undoubtedly been applied late in the season after the foliage had become relatively inactive. On the basis of these results much attention will be given to sprays on the foliage as a means of preparing both greenwood and hardwood cuttings for rooting."

DRAINAGE AND WATER CONTROL DIVISION

Hydrologic - Land Use Studies

North Appalachian Experimental Watershed at Coshocton, Ohio - L. L. Harrold reports: "The rainfall for the month totaled 2.24". Observations on the small watersheds revealed that the soil is very dry and shallow cracks appeared on much of the area. During the period April 26 to May 24, the moisture content of the plow layer (in alfalfa meadow plowed for corn) decreased from 25.7 percent on the former date to 18.3 percent at the end of the period. In the same period the land disked for corn decreased from 25.3 percent at the start, to 22.5 percent at the end of the period. This comparison shows the effectiveness of the residue left on the surface on the disked area for moisture conservation.

"Corn planting on the various fields and watersheds was completed in good season. About half of the corn ground on the government farm was prepared with the disk and spring tooth harrow without plowing. Two small watersheds, 188 and 191, were prepared by this method of surface tillage which left a good share of the sod residue on and near the surface.

"Inspection of the field trial seedings of legume-grass mixtures by disking without plowing show excellent stands of both legumes and grasses with one exception where the seeding was made late when the ground was dry and only one rain of about one-half inch had fallen after seeding. This seeding may yet come through better than anticipated. One seeding on better soil than the average will make a good hay cutting this first year if the season continues favorable."

Blacklands Experimental Watershed at Waco, Texas - H. O. Hill reports: "On Monday night, May 1, there was a rain of 7" in less than 5 hours. Rainfall intensity was 7.44" per hour for a five minute period and 5.76" per hour for a twenty minute period. There was considerable runoff and it is the maximum record yet obtained at the project. It is probably about a 25-year rain. Records obtained at Y-2, W-1, and W-2 were good."

Central Great Plains Experimental Watershed at Hastings, Nebr. - I. W. Bauer reports: "Precipitation at the Meteorological Station for May was 5.59". The total since the first of the year is 13.11" which is 4.80" above normal. There was considerable runoff this month from all plots. Peak rate of 4.31" per hour was from 19-H, a subtitled oats plot.

"The wet condition of the soil delayed the planting of oats and barley until the 9th of May. The stands of oats and barley that were planted late are very thin with the weeds about as tall as the grain. Corn was planted in the plots on May 19 and 20. The stands of corn on all plots are good. There was some damage from the rain on May 27 especially near the flumes. There was also some damage from cut worms.



"Mr. C. E. Ramser visited the project on the 17th and 18th of the month. C. J. Francis, Regional Engineer, and Messrs Bauer and Mockus of the Hastings project accompanied Mr. Ramser on a visit to a number of the Soil Conservation Districts in this territory."

Hydrologic Studies - LaFayette, Indiana - R. B. Hickok reports: "Rains occurred on 10 days during the month at the Throckmorton Farm and 13 at the Dairy Farm, totaling 4.22" and 4.68", respectively. While the total rainfall was near the normal for May, it was so distributed over the month to greatly hamper field operations and delay planting. Several storms produced substantial runoff. New automatic sampler installations were put into operation on all of the watersheds to be in corn, before the land was plowed, so complete fertility loss records for the crop season can be obtained."

"Mr. R. R. Poyner of the Purdue Agricultural Engineering Staff started work on studies of equipment and operational problems in connection with mulch culture. A working plan is being prepared to cover this work, as a line of the cooperative studies with collaboration by the project technicians. Immediate work is to be on development of mulch from meadow after-math and seed bed preparation for corn. A tool bar has been built for attachment to a Caterpillar tractor so as to provide positive depth control and power for testing various sub-tillage tools and plots have been laid out on the Throckmorton Farm for an experiment for determining correlations of crop response and soil physical conditions with different methods of preparing the mulch and seed bed."

"The special technical committee appointed in March by the Associate Director of the Station to prepare recommendations for a more adequate research program in soil and moisture conservation in the State has been active and on May 4-6 three members accompanied Mr. C. E. Ramser of the Washington Research Office of the SCS and Mr. Kenneth Welton, State Conservationist of the SCS on an inspection of several Soil Conservation Districts in the State to consider field problems and research needs. A preliminary draft of a report for the Committee was prepared by the writer and submitted to the other committee members for review."

Arnot Soil Conservation Experiment Station, Ithaca, N. Y -  
B-2 - John Lamb, Jr., reports: "Average precipitation amounted to 4.92", approximately 40 percent above station normal. The heaviest rainfall occurred two hours before midnight on the 6th and continued on the 7th until 9:00 a. m. with an average total of 2.15". There were two short intervals of high intensity but otherwise it was a good, steady rain."

Hydrologic Studies - Cherokee, Oklahoma - H. A. Daniel reports: "There were four light showers and one rain storm of 1.65" during the month of May. This rain caused runoff from most of the plots and watersheds. The total precipitation from January 1 of this year to date was 12.26". This is 3.22" above the long-time average for the period."



Microbiological Studies - Lincoln, Nebraska - F. L. Duley reports: "The excessively wet profile has made the nitrate plots more difficult to sample and the results less dependable, due to the danger of leaching nitrate out of the sampling zone. Samples are being taken to show nitrate production during spring. A new set of plots to determine effect of rate of straw application on nitrate production, soil temperature, and health and vigor of corn plants has been started. An article on a method for determining the stability of soil structure was accepted for publication by Soil Science. An illustrated lecture and laboratory demonstration on the work of the project was given a group of about 90 4-H Club boys by F. L. Duley and T. M. McCalla."

Hydrologic and Microbiological Studies at College Park, Md. - H. W. Hobbs reports for April: "Land Use Studies - Rain occurred on 11 days during the month, while on April 4, .06" of mixed rain and snow was recorded. The total was 3.42" or exactly normal for April, but the accumulated excess at the end of the month was 12 percent above normal. The sandy loam soil watershed with an excellent winter cover of wheat and vetch over 2 feet high which had been drilled on the contour, produced no runoff. All the other watersheds had 2 to 10 runoffs during the month, with peak rates occurring from 6:45 p. m. to 11:00 p. m. on April 24. A rain of .89" in 9 hours with maximum 5-minute intensity of 2.76" per hour produced the moderate runoffs. Considerable time was spent getting rain gages, water level recorders and small H-Flumes made, and installation instructions written for shipment to China to initiate hydrologic studies there. The topographic survey of the woodland watershed was completed. The checking of all computations was completed for the tentative report on contour strip cropping, contour tillage above a diversion terrace compared with up and down hill planting."

"Microbiological Studies - There were five runoff periods on the crop residue plots (wheat, straw, and lespedeza - mulched, disked and incorporated (plowed) during April. Runoff was small because of cover afforded by winter wheat growing on the plots. Wheat growth was decidedly better on plots receiving legume residues than on those receiving wheat straw. This observation is in agreement with last year's findings. No striking differences in either nitrate nitrogen or plant growth substance content was found in soil samples taken under the two types of residue. However, only a few samples were tested. Soil moisture continues at about field capacity under all crop residue treatments. This moisture condition, which has been measured at a six inch depth by means of Mr. Slater's gravimetric plugs, has prevailed with only minor variations since the middle of November 1943. These findings seem logical in view of the abundant precipitation, small runoff losses and dormant state of the vegetation during the period mentioned."

## Runoff Studies

Region IV - Bentonville, Arkansas, and Muskogee, Oklahoma - V. D. Young reports: "At Bentonville, the monthly mean was 5.63" and was 0.45" greater than the Weather Bureau normal. There were seven days on which runoff occurred on one or more of the watersheds. The only watershed not showing runoff was the pasture watershed. The highest runoff rate from the cultivated watersheds was .591 cfs per acre.

"There were eleven days during the month of May on which precipitation occurred on two or more of the watersheds at Muskogee. The monthly mean precipitation from the watersheds was 4.49". This was 0.35" less than the Weather Bureau normal for Muskogee. The peak rate of runoff for the April storm from the 22-acre row crop watershed was about 10 times that from the 65-acre terraced area and from 14.5-acre watershed in alfalfa. The peak rate from the 25-acre grassed area was about 0.13 that of the row crop area.

Region VI - Colorado Springs, Colorado - H. K. Rouse reports: "Sustained ground-water flow was recorded on the gravely sandy loam watershed for the second time during the seven years of record. The flow this year is probably due to the exceptionally heavy snowstorm in April."

## Hydraulic Studies

Hydraulic Studies at the St. Anthony Falls Hydraulic Laboratory, Minneapolis, Minn. - F. W. Blaisdell reports: "The calibration study of the McCredie, Missouri, drop inlet culvert was approved the first part of the month. Materials have been requisitioned for the testing basin and the model. Designs for the experiment were completed and construction of the 1/4-scale model of the 2-1/2-foot square drop inlet culvert was well along at the end of the month. The University laboratory mechanic is assisting in the construction of the model.

"A model for testing outlets for low-head rectangular spillways was set in place and a few tests were made before it became necessary to postpone this work in favor of the McCredie, Missouri, drop inlet culvert calibrations.

"Mr. C. E. Ramser visited the project from May 22 to May 24, inclusive, and inspected our work. On May 23, Mr. Ramser, Professor P. W. Manson of the Minnesota Agricultural Experiment Station, Mr. L. G. Signell, Zone Technician, Mr. Harold Smith, District Conservationist at Alma, Wisconsin, and Mr. Blaisdell visited locations where structures had been constructed in Pierce, Pepin and Buffalo counties in Wisconsin. The failures of the outlets of several drop inlet culverts were noted. The trip brought out the need for improved outlets for notches, culverts, etc. The damage is being caused by whirlpools in the downstream channel, eroding the material from in back of the wing walls, eventually



undermining the outlet. The writer was subsequently informed by Mr. M. M. Culp, former Area Engineer in the counties visited, that he (Mr. Culp) and Mr. Harold Smith had made a survey to determine the number of structures needed to control erosion in Buffalo county. They estimated that 2500 structures would be required in this one county."

"Mr. M. M. Culp, Civil Engineer in the Regional Office, visited the project on May 30 and 31 to obtain special and general information to be used in the design of structures. He also discussed the research work in progress and made valuable suggestions regarding future work. A specific question by Mr. Culp was in regard to the design of a SAF outlet for a twin 5-1/2-foot square drop inlet culvert. Mr. Culp had estimated the outlet cost to be \$1800 whereas, due to a wet stream bed and the probably necessity of using a cofferdam, a contractor roughly estimated the cost to be \$3000 to \$3500. As a result of the conference with Mr. Culp, it appears that suggested changes in the design will permit a very substantial reduction in the contractor's cost estimate."

Hydraulic Studies at McCredie, Missouri - B-2 - D. D.

Smith reports: "The hydraulic tests of 3-year-old grasses in channel 9 were completed May 19. Three-year-old bluegrass gives the best protection, the same as the 2-year-old bluegrass tested last year. Three-year-old timothy-redtop appeared to allow greater scour than the 2-year-old timothy-redtop. This was the result of heaving of the grass clumps during the winter.

"A mathematical relationship for the point at which shingling of bluegrass begins for both the fall and mature growth stages was developed from the low velocity tests of last year.

"Mr. Zingg has been working on the effects of farm ponds and wild-life reservoirs on flood flow for the Meramec River watershed. He has map locations for 253 wild-life reservoirs and at present is studying the routing of runoff hydrographs through these reservoirs."

Hydraulic Studies at Ontario, Oregon - Albert W. Marsh reports: "Headquarters for the summer were changed to Ontario, Oregon, where further irrigation and infiltration experiments will be carried on in connection with the difficulty of permeable soil found in that vicinity.

"A diagram for a new combination weir and takeout control box was submitted to a local tin shop and 18 of them ordered. These employ the proper clearance of sides and bottom in relation to the head over the crest, but have a short stilling pool. A baffle plate produces a still, smooth flow to the weir plate, however.

"Weirs of the type used last year were installed on 8 wheat plots located on a slope of approximately 6 percent on the Experiment Station. This is the beginning of a long-time experiment to observe the effect of different cultural treatments such as method of plowing, turning under residues, and type of rotation on the infiltration rate of the soil. The first irrigation of these plots was made during this period.



"Runoff and supply ditches were plowed out on the regular plots, and runoff weirs were set using the same V-notch weirs as last year. These plots are in barley this year. Instead of using earth bank stilling pools and spiles, which are prone to wash out, V-shaped troughs were constructed of 1 x 6" lumber having 1/2-inch openings covered by sliding metal gates through which water is admitted to the individual corrugations."

Hydraulic Studies at Prosser, Washington - S. J. Mech reports: "Observations during irrigation indicated the following:

1. The infiltration and erosion in those furrows compacted by the wheels of the ditcher were materially affected. Those furrows in which the wheels traveled absorbed water slower and eroded less rapidly than did those which were not so compacted.
2. It seems that range in the erosion from the contour corn plots was not as great as had been anticipated. That on the plots irrigated downhill, had a very great spread between the 3 different rates of application. Soil loss calculations will provide more exact information on this point.

"It is hoped that some measurements and calculations may be reported next month."

Hydraulic Studies at the California Institute of Technology, Pasadena, Calif. - Vito Vanoni reports: "Report No. 70-CF-41 entitled "Hydraulic Model Tests of Edwards Creek Dam Spillway" by Hans Albert Einstein, was prepared and copies sent to the Regional Office and to the Washington Office. A copy of this report is available for loan to members of the Soil Conservation Service.

"A short model study was made of the so-called "T" dissipator for pipe outlets. The design proposed consisted mainly of a short pipe placed at right angles to the pipe line, the diameter of the short pipe being about 1.5 times that of the pipe line. Experiments showed that this could be improved by placing elbows at the ends of the short pipe, which were turned upwards at an angle of about 60° from the horizontal. This structure is intended for use in a particular application near Watsonville, California, where flood waters must be discharged over a rather steep bench on to a flat plain, where it is not necessary to reduce the erosion to a minimum and it is necessary only to protect the structure itself."

#### Sedimentation Studies

C. B. Brown reports: "A field investigation was made in the Black Hills of South Dakota to determine the feasibility of projects for preventing water loss in stream beds. All of the important streams flowing eastward out of the Black Hills lose a considerable part of their water in crossing a belt of cavernous limestone between the central crystalline area and the Plains to the east.

It is maintained by local interests that this condition reduces the available stockwater, decreases the water supply for irrigation of feed crops, and prevents successful stocking of the lower sections of the streams with fish. The investigation involved a geological study of the zone of water loss through the limestone, analysis of the available data on rainfall and runoff, consideration of the effects of stream sealing on artesian water supply, and a brief survey of the extent of agricultural use of stream water for stock and irrigation. Analysis of the data is in progress and a report is being prepared on the study.

"An article summarizing the results of investigations of sedimentation in Baltimore Harbor was prepared for Soil Conservation and will appear in the July issue.

"Some time was spent in reviewing data and preparing recommendations for the Iraq Government on sedimentation problems involved in development of the Habbaniyah Lake flood control and irrigation scheme on the Euphrates River.

"An article entitled "Sources of Modern Sands in the Middle Rio Grande Valley, New Mexico" by Gordon Rittenhouse was published in the May issue of the Journal of Geology. The abstract of this article states:

'In the Middle Rio Grande Valley, New Mexico, serious flood damage, drainage impairment, and soil impoverishment are occurring as a result of the accumulation of modern sediment. The relative importance of various sources of the injurious sediment, which is largely sand, has been determined from the heavy-mineral composition of channel deposits of the Rio Grande and its tributaries. It was found that about 48-54 per cent of the Rio Grande channel and floodway sand deposits between San Acacia and San Marcial have come from the Rio Puerco, 19-21 per cent from the Rio Salado, and 25-33 per cent from the rest of the drainage basin. The Rio Puerco drains about 21 per cent of the watershed, and the Rio Salado about 6 per cent. Of the channel and floodway deposits between Albuquerque and Bernardo, about 21-39 per cent have come from the Rio Jemez, 2-6 per cent from the Rio Galisteo, 0.6-2.0 per cent from Santa Fe Creek, 11-37 per cent from the Rio Grande above Cochiti, New Mexico, and the rest from small tributaries for which separate evaluations were not made.

'Tributary contributions to the main stream apparently did not change greatly during the five-year period of investigation, 1937-41. Since 1880, however, there have been marked changes in contribution from some tributaries and in the mineral composition of the Rio Grande sands between San Acacia and San Marcial.

'All source evaluations were based on the hydraulic ratios of the heavy minerals. The reasons why other methods of representing mineral compositions are not suitable for source evaluations are outlined.'



Sediment Studies at the California Institute of Technology, Pasadena, California - Vito Vanoni reports: "Some progress was made in the modification of the 10-inch flume for studying bedload transportation. The following manuscripts were submitted for approval for publication: "Sediment Transportation Studies at the California Institute of Technology" by Vito A. Vanoni, and "The Application of Sediment Transportation Research to Hydraulic Engineering" by Hans Albert Einstein. These manuscripts are intended for publication in Engineering and Science, the monthly publication of the Alumni Association of the California Institute of Technology.

"Work was started on the observations of temperature density currents at Shaver Lake in the Sierra Nevada Mountains. All equipment was tested and a number of velocity profiles and temperature profiles were made. The interface could be located very easily, either with the current meter or with the bathythermograph.

"Two field trips made during the month gave ample opportunity to study erosion and sedimentation in streams and at control structures. One of these trips was made to San Timoteo Creek in San Bernardino and Riverside Counties, along which the right of way of the Southern Pacific Company extends, and the other was the Los Posas Barranca in Ventura County, which is on an old SCS demonstration project. On the first trip a visit was made to a number of rather large and expensive structures which are used to control downcutting in the stream, a condition which has been progressing rapidly in recent years. The second trip provided an opportunity to observe erosion in a gully adjoining valuable agricultural lands. A control structure in this gully, costing approximately \$30,000, had been undermined during the last season due to downcutting in the stream below. The laboratory was asked to cooperate in recommending construction work for repairing this particular structure. A brief study of this condition is planned in the laboratory.

"In all of this work the problem of stable grades of streams is emphasized. This is a very complicated problem, the solution of which will probably come through a combined field and laboratory study involving detailed experiments and comprehensive field observations. A number of illustrations were seen of the principle that when sedimentation is prevented in one reach of a stream, conditions downstream will be disturbed and changes can be expected which may cause damage."

#### Drainage Studies

Drainage Investigations at St. Paul, Minnesota - D. C. Miller reports: "Little progress was made on the peat report for this period as much of my time was spent on the American Society for Testing Materials activities chiefly in connection with preparation of a report as chairman of the Working Committee of Sulfate Resistance. During this period I attended the meeting in Chicago of the ASTM Committee C-4 on clay pipe."



## IRRIGATION DIVISION

### Storage of Water Underground for Irrigation

San Joaquin Valley, Calif. - Dean C. Muckel, Pomona, Calif., reports: "Fourteen of 45 ponds now constructed were put in operation during the month of May. These ponds are 0.01 acre and are located in various parts of Kern and Tulare Counties, California, where ground-water replenishment is needed and will be possible on the completion of the Central Valley Water Plan. The ponds are to be supplied continuously with metered water either from wells or canals and a constant head of about 1.0 foot maintained by float valve arrangement. Previous records in the Valley show that the percolation rate decreases with continued application of water and the project has for its purpose not only to determine the difference in percolation rates on different soil types but also to find, if possible, some means of maintaining a high rate or at least to retard the decrease in percolation rates. Rates obtained during the first two weeks of run varied from about 10 acre-feet per acre per day to less than 1 acre-foot per acre per day depending on the location of the pond. All rates showed the usual decrease after the first few days.

"A conference was held in Riverside to work out a usable form for field and office computations and also to discuss the handling and distribution of records by the various cooperators. The Division of Irrigation is charged with the coordinating, computing and analyzing of the records. Considerable time was spent in educating the several observers in operating the ponds according to a standard system so as to make all records comparable. Some supervision and recommendations were given in the selection and use of certain equipment."

Arthur A. Young, Pomona, Calif., reports: "Laboratory studies of sample cores of soil obtained in the San Joaquin Valley were continued at the Riverside Salinity Laboratory. Air in the water supply became a problem as it was entrapped in the soil of many of the cores, materially reducing the rate of flow through the soil a difficulty that was overcome by first heating the water to drive out the air and then cooling it before it entered the soil. Air also entered the soil through the stems and roots of grasses grown on individual cores; when the grass was cut below the water surface the difficulty ceased. Permeability rates through different sections of the cores are being tabulated and plotted to show the effect of resistance to flow through the soil at different depths from the surface."

Fred C. Scobey, Berkeley, Calif., as Analyst for the Division of Irrigation for the Central Valley Project of Calif., reports progress in development of several types of standard forms to reduce office work and expedite transmission of copies of monthly reports of findings to the various participating agencies."

## Snow Surveys and Irrigation Water Supply Forecasts

Western Montana, Western Wyoming, Northern Nevada, Idaho, and Washington - James C. Marr, Boise, Idaho, reports: "Information reaching the Boise office indicated that water-supply conditions were closely in accordance with forecasts insofar as runoff was concerned. No drought had developed during the month of May and there was no shortage of water or moisture, due to the fact that the season was late and the water requirements correspondingly less than usual. However, the outlook was for water shortage during mid or late summer. Final visits were made to several snow-survey shelter cabins for the removal and safe storage of bedding and other equipment and for inspection of the cabins. Snow courses and snow survey cooperators in the vicinity of Twin Falls and Burley were visited and the necessary arrangements for cooperation and field work were made to insure continuation of the snow surveys in that area next year."

Oregon - R. A. Work, Medford, Oregon, reports: "With completion of Transcript of the 1944 Columbia Basin Water Forecast Committee meeting, full attention was directed toward the 1944-45 snow survey program. Arrangements were completed for construction of two new shelter cabins. Additional snow-cover runoff forecast relationships were developed for Rogue and Klamath Rivers."

Colorado, Eastern Wyoming, Eastern Montana, South Dakota, Arizona, New Mexico - R. L. Parshall and Carl Rohwer, Fort Collins, Colorado, report: "The May 1 snow survey and water supply forecast reports for the Missouri-Arkansas, Colorado River, and Rio Grande drainages were issued on the 10th and 11th and promptly mailed out to an extended list of subscribers. These issues concluded active snow survey work for the time being. However, because of the interest of the Army Engineers in the probable high water in the Rio Grande during early June, a limited number of actual snow surveys were requested as of June 1. Steps were taken and arrangements made to collect data in the San Luis Valley area. Requests were also made for supplemental information covering the Colorado, North and South Platte, and Arkansas drainages as to the general snow cover on June 1. A few of the streams, such as the Rio Grande, Gunnison, and tributaries to the South Platte, have during the month reached flood stage. High snow is still intact. The runoff has been more than sufficient to fill reservoirs and for northern Colorado much water is passing unused. Attention was given to the purchasing of supplies and equipment for use in connection with the 1945 snow survey season. Plans were being made for the construction of a snow survey shelter cabin at Headquarters Park, west slope of the Snowy Range, about 40 miles east of Saratoga, Wyoming."

## Kootenai Investigation, Idaho

J. C. Marr, Boise, Idaho, reports: "Spring operations at the evapo-transpiration station at Bonners Ferry were started. As subsidence had occurred in some tanks and efforts to raise the soil surface by small additions of soil from time to time failed, all the tanks were cultivated and soil surfaces built up and the crops reseeded. A survey of drainage facilities in Kootenai Valley was made by Mr. Rosebaugh."



## Evapo-transpiration and Seepage Losses Affecting Irrigation Practices

Santa Ana Canyon Water Supply Study. (Orange and Riverside Counties, Calif.) - Harry F. Blaney, Los Angeles, Calif., reports: "Observations on evaporation, evapo-transpiration, temperature, humidity and precipitation were continued in the Prado Dam area of the Santa Ana River Basin. Measurements were also made on depth to ground water, in cooperation with the U. S. Geological Survey. Several conferences were had during the month with members of the U. S. Geological Survey staff and representatives of the Orange County Water District and the Orange County Flood Control District. Water samples were taken from typical springs and wells in the area for complete chemical analyses."

Pecos River, New Mexico - Harry F. Blaney reports: "The compilation of weekly evaporation, evapo-transpiration, temperature, humidity, precipitation and wind movement records at stations in New Mexico was continued."

Blackfoot Dam, Idaho - Wayne D. Criddle, Boise, Idaho, established the evapo-transpiration station for the Indian Service in the Blackfoot River area of southeastern Idaho. The station was moved from Grays Lake to Blackfoot Dam. Mr. Criddle spent considerable time in mapping a program for the operation of this station and the aims to be accomplished.

Seepage studies - Carl Rohwer, Fort Collins, Colorado, reports: "Work on the preparation of a report on seepage from canals was continued. Plans were made for testing "Stabinol", a new waterproofing compound, to determine its value in reducing seepage. Several farmers were given assistance regarding their seepage problems."

## Irrigation Practices as They Affect Water Supplies

San Fernando Valley, Los Angeles County, Calif. - Harry F. Blaney reports: "A study of high ground-water conditions in San Fernando Valley was made. An analysis of the data available indicates that the high precipitation in seven years (1936-43) is the principal cause of present ground-water conditions. The precipitation index for the 7-year period, 1883 to 1890 (previous high record), is 129, while for the 7-year period, 1936 to 1943, it is 141. The year 1941 showed the highest index of record - that of 241. A conference of representatives of the Los Angeles County Flood Control District, State Engineer's office, Soil Conservation Service, University of California, farmers, and of the Agricultural Department of the Los Angeles Chamber of Commerce, to consider the problem, was attended."

"It was estimated that in 1943, with a rainfall of 22.2" on the area east of Sepulveda Boulevard (east half of Valley) the total precipitation falling on the valley floor was 135,000 acre-feet. Of this amount 23,500 acre-feet were lost by surface runoff, and 66,500 acre-feet by evaporation and transpiration, leaving 45,000 acre-feet for percolation. Streamflow from the Tujunga and Pacoima contributed 88,200 acre-feet, of which 30,200 acre-feet were lost through runoff, leaving 58,000



acre-feet for percolation. Thus the total reaching the ground water from rainfall on valley flood and percolation from streamflow amounted to 103,000 acre-feet. In addition some 11,000 acre-feet of water were spread by the City of Los Angeles, and it is estimated that about 25 percent of the irrigation water delivered to the farmers in the east side of the Valley in 1943, or 9,000 acre-feet, percolated to the ground water as return water from irrigation."

#### Design, Invention and Testing of Irrigation and Drainage Apparatus

Parshall measuring flume - R. L. Parshall reports: "Requests continue to come for information relative to the use of this flume - some from industrial organizations and others from the Corps of Engineers. The Engineering News of May 18, 1944 contained an article on the use of this device in the field of sanitary engineering.

"A problem was presented in satisfying three water users drawing from a common lateral where the rights to the amount of water taken are based on the number of shares held by each farmer. It was proposed to install a 2-foot Parshall measuring flume at the head of the lateral and a 1-foot flume about 1/2 mile down stream. The difference in discharge, as indicated by the two flumes, fixed the amount of water to be used by one of the interested parties. The discharge through the lower flume to be maintained at a definite amount to satisfy the other two users. A design of a practical turn-out structure was prepared, consisting of a reinforced concrete headwall, two lengths of 12-inch tile, and a special wooden gate provided to regulate the flow from the lateral. Labor, materials, and equipment were found to be of such limiting factors that the improvement in handling this distribution problem is now deferred until later this season when it is hoped the work can be done at a more reasonable cost."

Hanger for snow sampling tubes - R. L. Parshall, Fort Collins, Colorado, reports: "A new design of hanger for weighing snow-sampling tubes has been developed. A full-sized model of this device was made and sent to the Berkeley office of the Division of Irrigation for inspection."

#### Flow of Water in Canals and Pipes

Water-supply Improvement - Fred C. Scobey, Berkeley, Calif., reports: "Work as Consultant to Region 4, SCS, on the Grand Canal project to serve seven water districts along the Pecos River in Texas was continued, largely in terms of commencing the canal higher on the river than was previously decided upon. The line of the proposed canal was drafted on the proper sheets of the Pecos Investigation Atlas, as printed in Washington by SCS. Preparations are going forward to supply field parties with copies of these Atlas sheets, with the proposed Grand Canal projected thereon. Supplementing these maps will be a list of specific data required for the office part of the second phase of the Grand Canal study. It is proposed that a field survey party will be delegated by the Fort Worth Regional Office, to commence field work some time after the start of the new fiscal year.

"Supplementing the grand-canal idea are several sub-projects, all necessary to the welfare of the community, including: (1) lessening the flood hazard by a research study on a model of the present spillway facilities of the Red Bluff Reservoir, followed by modifications of this spillway necessary to make the capacity more nearly approach that in the original design; (2) eradication of salt cedars along the Pecos River, of which there are some 13,000 acres above McMillan Reservoir, alone; (3) possible removal of salt brine by pumping it over a rise into an old salt lake bed, where the water would be evaporated and the salt deposited; (4) construction of a deep drainage cut to draw off continually the salt accumulation now concentrated by evaporation in Toyah Lake, near the city of Pecos, Texas, which would provide storage of sweet flood water to augment the flow in the Pecos River."

#### Rehabilitation of Irrigation and Drainage Enterprises

Runkle Canyon and Gabbert Canyon, Ventura Co., Calif. - Paul A. Ewing, Berkeley, Calif., reports: "My appraisal of benefits and damages on the Runkle Canyon and Gabbert Canyon investigations in Simi Valley, Calif. Soil Conservation District, were transmitted to Mr. Barnes, State Conservationist, for forwarding to the directors of the District."

San Joaquin Valley, Calif. - Paul A. Ewing reports: "Informal cooperation with the Bureau of Agricultural Economics entered into in April has resulted in my temporary detail to that Bureau for determination of duty of water requirements, cost of water pumped from wells and supplied by gravity, and other ascertainment being undertaken by the Bureau of Agricultural Economics for the Corps of Engineers, U. S. Army, in its San Joaquin Valley investigations. The work will probably last several months."

#### Customs, Regulations & Laws Affecting Farm Irrigation and Drainage

Central Valley Project, Calif. - Wells A. Hutchins, Berkeley, Calif., reports: "The work on Problem 12 (Payments from indirect beneficiaries) was completed with the signing of the final report and its submission to the Director of the Central Valley Project Studies. On Problem 16 (Water prices) two subcommittee reports were completed, approved by all study group members, and submitted to the Problem Leader: Study 6 (Cost and value relation of irrigation services) and Study 11 (Farm property values as a measure of project benefits)."

#### Drainage of Irrigated Land

Imperial Valley, Calif. - William W. Fox, El Centro, Calif., reports: "Trials of the new drainage sump models for finding correct screening materials to admit water and exclude fine sand showed that, with a five-foot diameter tank, the equipment is adequate. Work is being continued. Piezometers were installed on the Vessey property at the site of an open drain that is to be constructed. This study, to be continued for some time after construction takes place, will ascertain the effectiveness of such a drain under existing soil conditions. Thirteen packed-sample permeameter runs were made for correlation with moisture-tension



observations. The Bates moisture study was completed. Inadequate water penetration was the cause of a salt accumulation in the soil and resulted in poor condition of the grapefruit grove. Laboratory equipment and techniques, developed preliminary to moisture-salinity plot work, include a press for extracting the soil solution and a method of determining field capacity by moisture tension. The April issue of Soil Conservation carries a story on the work of the Imperial Valley Drainage Investigation entitled "Goldbergian Gadget May Boost Valley's Output."

Pecos Valley in Texas and New Mexico - Dean W. Bloodgood, Austin, Texas, reports: "During the month I made a trip to the Pecos Valley of Texas where I consulted and advised with the Red Bluff Water Power Control District, the seven Water Improvement Districts, Federal Agencies, and other interested parties regarding seepage losses from irrigation canals, irrigation problems, and water losses caused by crawfish burrowing in ditch bottoms and ditch banks. These problems have a direct bearing on the drainage situation in the Pecos Valley and are a source of much of the high ground water. The Barstow Drainage District is active at the present time constructing new open drainage ditches and improving others. The Cedarville District near Barstow is contemplating construction of drainage ditches some time this fall. The Grandfalls Drainage District will become more active in the near future in installing drainage observation wells - data from which will assist them in the design of their drainage system. The Pecos Valley in Texas has sufficient water storage at Red Bluff Dam (185,000 acre-feet) for this season and next year's water requirements; whereas there is a water shortage on the Carlsbad Reclamation Project (Pecos Valley in New Mexico) and only 50,000 acre-feet of water is in storage at the present time at the Alamogordo, McMillen, and Avalon Dams. More grains are being planted which will be followed by alfalfa. Cotton acreage has been decreased due to labor shortage on the irrigated farms."

#### Control of Silting in Irrigation and Drainage Systems

Texas - Dean W. Bloodgood reports: "The yearly progress silt report for the water year ending September 30, 1943, is practically completed and should be mimeographed and ready for distribution some time during the early part of June. During the month we completed the analyses of two samples of silt I obtained from Lake Diller near Albany, Texas last March. A sample of silt for analyses was also obtained from the Hope Retard Dam on the Rio Penasco, near Hope, New Mexico."

#### Evaporation from Water Surfaces

Evaporation stations in Texas and New Mexico - Dean W. Bloodgood reports: "At Buchanan Dam, Texas, the evaporation losses from the various pans for April were as follows: standard Weather Bureau pan, 8.99"; Bureau of Plant Industry pan 6.86"; and Division of Irrigation screened pan, 6.48". For a nine-months period, since the station has



been in operation, the coefficient for the Weather Bureau pan is 0.78; for the Bureau of Plant Industry pan, 0.98; and for the Division of Irrigation screened pan, 1.00. At the Marshall Ford Dam, Texas, standard Weather Bureau and Division of Irrigation screened evaporation pans were installed during the month. A rain gage and anemometer were also installed. This dam is on the Colorado River and about 40 miles downstream from Buchanan Dam. The station is being operated in cooperation with the Board of Water Engineers and the Lower Colorado River Authority. The proposed site for an evaporation station at Avalon Dam near Carlsbad, New Mexico, was visited, and the status of the station was discussed with the Superintendent of the Carlsbad Reclamation Project, who plans to cooperate with our Division in evaporation investigations. The equipment for the station will probably be installed soon after the first of next fiscal year.

#### Pumping for Irrigation

Use of Diesel engines for pumping plants - Carl Rohwer, Fort Collins, Colo., reports: "In answer to a request from a Diesel engine manufacturer, data were collected on present use of Diesel engines for pumping plants and the possible future demand. The study, which covered Colorado, Nebraska, and New Mexico, indicated that the greatest demand for Diesel engines would be for making replacements of engines worn out in service rather than for new installations. Because of the large number of plants already installed, the number of engines worn out annually exceeds the number required for new projects.

6/27/44

